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Office Machines —

Records Maintenance Testing, Selecting

by C. C. Cather

The far flung offices of the Southern Pacific Railroad offer an excellent proving ground for office machine control systems.

A RECENT issue of an industrial magazine used a picture of an archaic appearing 1890 office to emphasize the importance of reducing the cost of paperwork. In commenting on the 1890 picture (the New York City office of a large rubber company) the article mentioned that in one way it was more efficient than the same office today: its clerical-to-production employee ratio was 1 to 10 in 1890, compared with 1 to 4 today.

This is not too surprising, when one considers the large volume and varied nature of paperwork necessary for conducting almost any business today, and that a substantial part of the paperwork is necessary only to meet the requirements of various governmental agencies. For example, I recently heard of a company that now makes 1,083 individual reports to Federal, state, county and city government agencies each year, compared to 41 reports 10 years ago.

Because of the widespread nature of railroad business, performed in many cities and states and involving thousands of transactions each day, paperwork costs are a matter of great importance to any railroad company. Every large railroad company uses thousands of office machines.

Practically all railroad work requires the use of office machines at one time or another. Movement of the smallest item of freight requires the typing of a waybill. Every ticket sold must be accounted for. All carriers involved must be paid their share of the revenue from interline traffic.

The purchase and issuance of every spike, tie or other item of material must be recorded. Each payment of money must be covered by a check or voucher. Letters, contracts, and numerous reports of various kinds must be prepared.

All of this work requires the use of people, and machines to assist the people. Although this discussion is about office machines, I think you will agree that there are very few machines, if any, that are so versatile, flexible and generally dependable, and that possess so many potentialities, as the most common of all office instruments—the ordinary pencil in the hands of thinking men and women. Office machines are merely another aid and extension to the abilities of people. A means of effectively performing work, with a minimum waste of human effort.

Like any large company, the Southern Pacific uses many office machines in its main office and in the many offices on its lines and in cities where it does business.

There are now more than 10,000 machines, representing an investment of about $1,500,000, in offices of the Southern Pacific Company and its subsidiaries. This is made up of about 5,000 typewriters, 2,000 adding and calculating machines, and 3,000 machines of other kinds.

In addition to the machines it owns, this company rents machines of various kinds, such as IBM punched card machines, microfilming equipment, and other types of special purpose machines. Its machine rental costs now run about $500,000 a year.

In the Southern Pacific organization the General Auditor has jurisdiction over the requisitioning, testing, purchase, use, and care of office machines for all departments.

Because many of the machines are used in the Accounting Department, or are used to perform work for

accounting department purposes, and because the general auditor also has jurisdiction over the design and use of all forms, this centralized control over office machines has proved very effective.

The detailed supervision of office machines is delegated to the supervisor of office equipment. He keeps up to date on new machines and devices by reading business magazines and pamphlets, observing machine methods in offices of other companies, keeping in touch with manufacturers' representatives, and by visiting plant and sales office demonstrations.

He also obtains information concerning new machines and methods from other railroads, from reports made by the Association of American Railroads, from our representatives who visit the offices of other companies, and from information given him by members of organizations such as the Systems and Procedures Association.

Machine Card File

In the office of the supervisor of office equipment are kept individual card records showing information regarding each office machine in use, specification sheets describing the various kinds of machines in common use, copies of requisitions covering machines issued, files containing information concerning various types of machines that are available, and reports of machine trials and tests.

Requisitions for office machines are prepared in triplicate by offices requesting machines, and are approved by head of the department or an authorized representative. The requisitions show the number of hours and on what type of work machine will be used, make of machine preferred, specifications as to type style and keyboard, number and capacity of counters, tabulation stops, width of carriage, electric or hand (if electric, kind of current, voltage, and frequency in cycles), and such other information as may be helpful in supplying a suitable machine.

Complete information is also shown on requisition, or in accompanying letter, as to why machine is necessary. In the case of additional machines ordered by station agents, notation must be made on the requisition, or in accompanying letter, to the effect that traveling auditor or station supervisor has approved the acquisition of machine being ordered.

The original and one copy of requisition are sent to supervisor of office equipment, the triplicate being retained in requisitioning office. Upon receipt of requisition in office of supervisor of office equipment, it is checked against specification sheets to see that it is correctly prepared and, if in order, is passed to general auditor for approval. When approved, the original is passed to purchasing agent, for filling from stock or for placing of order. The copy is returned to supervisor of office equipment for file and follow-up. If requisition is not approved, matter is appropriately followed up by supervisor of office equipment with department making the requisition.

Offices receiving machines are instructed to promptly furnish the supervisor of office equipment with the serial number and date received. The copy of requisition retained by supervisor of office equipment is used to follow up for receipt of this information.

Upon receiving information as to serial number and date machine received, the supervisor of office equipment makes two copies of a machine record card. One copy is sent to the office that received the machine and one copy is retained.

The machine record cards provide a complete record of each machine, from the date requisitioned to the date retired. The cards show the make of machine, model, serial number, description, cost, date purchased, date issued, person to whom assigned, date assigned, date transferred, date and cost of repairs, date retired, and salvage value.

The copy of card received by the office to which the machine is assigned is used by that office to keep a record of repairs, to make monthly check to see that machine is on hand and is properly cared for, to assure that it is used sufficiently to warrant retention, to provide a concise record of the acquisition, original cost and general description of each machine and to aid in taking annual inventory of office machines, made the first of each year and sent to supervisor of office equipment.

Verifies Inventory

The machine record cards retained by supervisor of office equipment provide him with a complete record of all machines in use, and the history of each machine. It is used to verify the annual inventory of office machines, and is also a ready source of information concerning the location of machines of particular types. This information is particularly helpful when information is desired concerning actual operating experience with a particular kind of machine.

In addition to maintaining machine record cards on a current basis, when machines are assigned, transferred, or released, a copy of the current year's inventory is posted to reflect any changes. Keeping the inventories on a current basis is very helpful to office equipment bureau, particularly when considering requisitions for additional machines. A glance at inventory will show what machines are on hand in each office, and the inventory record also indicates to what extent machines are used. A copy of the form used for annual inventory is attached.

When an office machine is assigned to any office written instructions are furnished regarding the care of machine,

and heads of offices are instructed to inspect machines at frequent intervals to see that proper care is given them.

The repair of office machines is one of the functions of Southern Pacific's Duplicating Bureau, which is operated under the jurisdiction of the Purchasing Department. Repairmen report to the supervisor of office equipment any cases of neglect of machines which may come to their attention. The supervisor of office equipment reports the matter to the office concerned, sending instructions showing what care should be given, and giving a copy of report to the head of the department in which machine is located.

Our repairmen service and repair practically all types of machines used by us, except machines for which service contracts are made with manufacturers. The repairmen keep themselves abreast of new developments in the machine field and provide much helpful information to the supervisor of office equipment.

In the case of new machines, repairmen make a careful and critical examination of the machine. In some instances new machines are taken apart to see what makes them tick, what materials are used, and to estimate how well they can be expected to stand up.

When a new machine is placed in use, the Duplicating Bureau takes a record of the serial number and keeps a record of all repairs made to the particular machine and to newly issued machines of the same type. In this way any defects in a particular type of machine become known. The information is given to the supervisor of office equipment, for appropriate follow-up with the supplier. This often results in the manufacturer improving the design or materials used in machines.

Mechanic Makes Report

No worn-out or obsolete machine is taken out of service until an examination and report is made by a mechanic. This report must be approved by the foreman of the service department, the supervisor of office equipment, and the General Auditor. When all approvals have been obtained the office concerned is informed, so that requisition can be forwarded for a replacement machine.

It occasionally happens that an office will have a machine which is not used sufficiently to warrant retention. Instructions provide that such machines should not be retained in anticipation of some possible future need, nor as a convenience for occasional use, but should be released for transfer to some office where they can be used regularly.

Office and bureau heads, traveling auditors and station supervisors regularly check into the use made of machines, to find any excess machines that can be released. The supervisor of office equipment is informed of such instances. He arranges for transfer of the machine to another office where it can be used to better advantage or for the return of machine to Duplicating Bureau. Here it will be placed in stock for reissue.

All offices have been informed that an office machine or device in which they are interested may be demonstrated in any office, to learn what the machine will do and its application to certain work, but the machine should not be left in the office for trial.

Requests for trials are made to the General Auditor in writing, mentioning kind of machine, what it is proposed to determine, and period for which trial is recommended. Unless trial of machine has already been made on the same kind and volume of work, the request for trial is approved. If trial has been made, the office concerned is sent a copy of the report of such trial, with recommendation that no further trial be made unless machine has been improved or there has been a change in volume of work, methods, or conditions.

Time Saver

This saves much time in all offices concerned and also prevents the embarrassment which might result if a machine is not purchased after a long trial has been made.

In the majority of cases trials of office machines and products are made in the Accounting Department, under the supervision of the supervisor of office equipment, and with the collaboration of supervisor of forms and methods and the department and bureau heads concerned. Regardless of where the trial is conducted, a detailed report concerning the results of trial is furnished the supervisor of office equipment. When appropriate, he furnishes information concerning the trial to other offices or departments that might be interested.

The nature of any tests or trials of machines is, of course, principally dependent upon the type of machine or product to be tested, and what information is sought. However, the following broad principles are generally observed:

1. All trials are made by the people who would operate the machines in regular use. Machine operators' opinions are considered highly important.

2. When practicable, the same type machine is tried in different offices, by several operators, and on different kinds of work.

3. Different makes of similar purpose machines are investigated or tested, and the experience of others is ascertained.

4. Due allowance is made for operator experience and proficiency when assaying the results of trials. When new principles are involved, or long standing work habits must be overcome, sufficient time is allowed to enable operators to become acustomed to a new machine and reasonably proficient in its operation.

5. Maintenance costs, often an important item of

expense, are carefully considered. We compare the costs under service contracts with the cost of maintenance by our own repairmen, and repairmen advise us as to serviceability of machines.

6. During the course of trial, appropriate consideration is given to the overall effects of the new machine. If installed, what changes in forms and methods and in the training of employes will be necessary? What personnel, space, electric power, servicing, and other problems will be encountered?

7. Ascertain the actual need of the machine to get the results sought. Sometimes the results sought can be better attained without the machine. By improving methods and scheduling, or the attitudes and skills of people, need for the machine may be obviated.

8. Gain the operator's acceptance prior to the installation of a new machine.

9. Follow up to see that the results expected from installing a machine are actually accomplished, and that machines are used to the best advantage.

10. Keep good records concerning the nature and results of trials. Inform other offices and departments, and companies with similar problems, concerning the results of trials.

11. Review the files covering machine tests and trials periodically. Changes in methods, personnel, or other conditions, or improvements in machines, often make further trials desirable.

12. Keep the importance of people and human factors always in mind. People must operate, control and think for machines. Automatic typewriters do not spell and correctly phrase words automatically, unless properly instructed by man.

Money spent for machines can become an expense, rather than an investment, if human factors are neglected. Investments in developing people, in improving their attitudes, skills and abilities, very often produce greater returns than investments in machines, and are essential to getting full value from expenditures for machines.

There are, of course, other factors to be considered when testing and selecting machines and products; such as price, durability, return on investment, availability, reputation of the maker, etc. However, the broad principles outlined seem to me to be of some importance, and to have rather general application.

Despite the statements sometimes made about big business, especially during election years or when labor contracts are being negotiated, business is conducted by human beings. Naturally it has many of the characteristics of people. One of these is that man cannot stagnate. He moves forward, or falls back. The same is true of business; we move ahead, or we fall by the wayside.

To keep going forward, the railroad industry always has research and development projects in progress, and railroad companies freely exchange information concerning studies of new machines and methods. These studies are made by individual railroads; jointly by several roads; in collaboration with equipment manufacturers and other industries; and through various committees of the Association of American Railroads and the Railway Systems and Procedures Association.

At the Southern Pacific Company we have in progress a number of studies concerning the application or extension of various new machines and methods to railroad work. In some cases these are joint studies, being made in collaboration with other railroads and various machine companies, and involving several railroad departments.

One such study has to do with extending the use of "card-to-tape," "tape-to-card," and other punched card machines. This equipment is now used in conjunction with teletype machines and multi-channel telegraph circuits for recording and transmitting information concerning freight car and train movements.

Railroads have been using punched card and teletype equipment for many years. The relatively new "card-to-tape" and "tape-to-card" machines provide the link between punched card recording and teletype transmitting equipment. Added to this are recent developments in the electronics field. These make it possible for 18 separate telegraph circuits and numerous telephone conversations to be transmitted simultaneously, without interference, over a pair of wires.

As many railroad operations require the recording of data at widely separated points for use at several other points, the new recording and communication equipment has many possibilities for use in railroad work.

Punched Card Records

Stated very briefly, the equipment enables us to record data in punched cards at various points and to automatically perforate tapes and teletype the information to several other points, separately or simultaneously. At the receiving points, teletype printers and re-perforators automatically print reports and concurrently prepare perforated tapes for mechanically punching cards. The cards are then run through punched card machines, in yard offices and in the general office, to prepare various records and reports concerning the receipt, movement, location, and disposition of freight cars and their ladings.

With this new recording and communication equipment, information essential to both shippers and railroads is made available more quickly and in more flexible form. Additionally, the receipt of information hours ahead of a train's arrival enables switching programs to be planned well ahead of time, advancing the handling and delivery of cars and freight.

Although our present use of the equipment is confined

to the preparation of reports and records concerning the handling of freight cars and trains, it also affords many opportunities for advancing and improving the performance of other work.

Several possibilities for extending the use of the new equipment are undergoing preliminary study, particularly with respect to work that involves the recording of data at widely separated points, that must be transcribed, accumulated, and consolidated at other points and in the general office. Time is an important factor in the performance of much of this work, and use of the new recording and communication equipment is expected to advance and improve its performance.

Another study of some importance has to do with recent developments in the copying machine field. A large amount of railroad paperwork involves the transcribing of information from one document to another, and the copying of letters, reports and documents of various kinds.

For example, about 75% of the information shown on the waybill correction account vouchers railroad companies issue each month is transcription work, information being copied from forms received from one carrier being shown on reply forms sent to other carriers concerned. Every large railroad company makes hundreds of such vouchers, and copies of waybills, freight bills and other documents, each month.

Some of the new copying machines offer distinct possibilities for reducing the cost and expediting the performance of this and other work. Although our tests indicate that each of the machines has limitations, and there are difficulties to be overcome, all have possibilities of application to some phases of our work.

None of the machines will reproduce "red" as "red," but this is not controlling. Credit figures can be, and frequently are, appropriately symboled and shown in black.

Red Ink Too Dear

During the depression one company, operating in the red for many months, is said to have reported its losses in black figures. A footnote explained it couldn't afford to buy red ink. Perhaps the custom of showing deductions and credits in red is one that business can no longer afford, if the custom deprives us of the advantages offered by the new dry process copying machines.

Another important limitation with some of the machines is that the material to be copied must be on translucent paper. This limitation is of some importance, since some of the possible applications in railroad work involve copying of documents received by one road from another. In many cases the forms are now printed on opaque paper. However, this problem can be solved if all roads standardize on translucent grades of paper for forms that must be reproduced with some frequency. Special committees of the Association of American Railroads are working on this problem.

None of the limitations and difficulties seems insurmountable. Our studies, and those being made by other railroads, are continuing.

The two studies mentioned also offer possibilities for remedying some of the work "input" and "output" problems in connection with the use of card operated high speed electronic calculating punches. They also tie in with other studies we have in progress concerning extending the use of punched card machines and methods to additional phases of work, and with other efforts being made to advance and improve the performance of work generally.

Jobs Speeded Up

With the "Card-to-tape," "Tape-to-card" and teletype equipment making possible the automatic reproduction and rapid transmission of data in punched cards, the flow of work to and from electronic punches and other machines can be accelerated.

Similarly, with copying machines making it possible to reproduce documents quickly and economically, the flow of source documents to key punch sections and of punched cards to calculating punches and other machines might be expedited. Instead of performing all work directly from original documents, delaying the movement of original documents, some of the key punch or other work might be performed from reproductions, advancing the movement of the original document to its point of final use. These are possibilities that are scheduled for further study.

To sum up, in these and other studies we have in progress, and in the testing and investigation of new machines, methods and products, we have but one angle of approach. It's the old "try-angle." We'll try nearly anything once—except running trains toward one another on the same track, where we don't have centralized traffic control.

What I have attempted to give here is a rather general outline of our practices, and an inkling of what we are planning for the future. While our methods for maintaining records concerning office machines and for testing and selecting new machines and products have proved effective, I don't claim our methods are the best. In fact I am sure that improvements can be made. **s/p/a**

MR. CATHER'S article was presented at the San Francisco Annual Systems and Procedures conference. He is vice-president of the San Francisco Chapter, SPA.

Punched Cards

and the

Systems Man

by John C. Peters

MANY systems men who may not be familiar with punched card work may be shying away from it because they feel it is too complicated and technical. To allay such fears somewhat, think about the pencil. Everybody readily recognizes that a pencil can be made to do different things by different people and this wide range of potential usefulness worries no one. A similar concept of a tabulating punched card is fundamentally important —it is just another modern tool available to business for the purpose of getting things done faster and more economically and probably more accurately.

Because punched cards are a modern tool of business, and an important one too, the systems man should understand the basic principles of punched card work and the many important considerations of a well organized and managed punched card section. I am going to present to you my ideas of what the systems man should know about punched cards.

Some of us in systems work are fortunate enough to have had experience with punched card work. Those who have not had this practical experience should acquire the basic knowledge. Two methods I can think of to do this are:

1. If your company already has a punched card section, arrange a *carefully planned* course of instruction by the supervisor of the punched card section. This should not take more than a week to ten days.
2. Attend one of the free courses given by the punched card equipment companies. This method will take longer because of the size of the class and because classes are usually only part time and they do spend some time on the technical aspects.

The systems man needs to know what a card is, how it is punched and have a general knowledge of the many different pieces of equipment, what operations each will perform, their capacities, speed, etc. and their cost either by rental or purchase. For the detailed technical knowledge of control panel wiring and operation, you can rely on the supervisor of the installation.

Whether he is working towards an initial installation of punched card equipment or is considering expansion of an existing installation, a systems man cannot do a good job without this basic knowledge of the principles and equipment.

As a systems man you should first look at this problem just like any other procedure change: compare the cost of one method with the cost of the other. With the basic knowledge just mentioned and your systems background you should be able to figure the cost of doing the job by punched cards.

Most punched card installations were started primarily because of one good sized operation or job. I know of no proven criterion which will tell you that when your job reaches a certain volume it would be economical to do it with punched cards. There are too many variables to consider. Generally speaking, if we make our decision on a cost comparison, we will be on pretty firm ground, although there may be some instances where the time element is important enough to outweigh an unfavorable cost comparison.

Customer service bureaus of the equipment companies can sometimes be used to advantage. You can experiment with a projected application in this way without obligating yourself for expensive equipment. You can do the key punching yourself and let the service bureaus process the cards for the finished reports, here again not obligating yourself for the more expensive equipment. You can also use these service bureaus for unexpected peak loads rather than take on more equipment.

It is always a good idea to check with other users of

If you want to get acquainted with tabulating equipment, here is a good "check list" type of article, prepared by an expert.

punched card equipment doing a job similar to your projected one because you will undoubtedly be able to benefit from their experiences. Punched card equipment is best suited to handle the mass production of office records. Exceptions to routine are hard to handle and punched cards that do not get multiple usage carry a cost factor that can make a procedure uneconomical.

There are 13 important considerations of a well managed punched card section. I will review them in order.

Supervisor—The most important person in any installation is the supervisor. The capabilities of this person directly limit the capabilities of the installation. He should have a good understanding of the work he is processing and a thorough understanding of the machines he is using, and he must also be able to train and supervise personnel properly.

It is very difficult, if not impossible, to find a person with all these qualifications. If you have a man in your organization who is thoroughly familiar with the details of the work to be transferred to punched card equipment and who has the qualifications for a good supervisor, do not hesitate to allow him *plenty of time* for schooling in the use of the equipment. If you must bring someone in from the outside, you must allow him sufficient time to become familiar with the details of the work. Whether the supervisor is someone from within the company or from the outside, he should be on the ground early enough to supervise the planning and installation of the new equipment.

A good supervisor should properly train those employees under him so that there is always someone who can take over the installation already established.

Proper equipment—plays a very important part in the successful operation of any punched card section. Don't make the mistake of figuring machine capacity too closely. It is always better to have a little reserve capacity to take care of breakdowns, possible fluctuations in workload or the addition of new jobs.

When making an initial installation, order the latest models available. Try to get new machines. Shy away from field transfers even though the new machines may carry a higher freight charge from the eastern factory. Where you have two or more machines of the same type be sure that they are identical on all specifications. The large tabulators have many variations in the specs; ordering these properly initially can save many headaches later.

Proper balance in types of equipment is important. A tabulator, the more expensive equipment, should not be frequently kept idle waiting for cards to be sorted. You probably need an extra sorter. A basic unit would be a tabulator, a sorter and a summary punch-reproducer. Use of the calculating punch, the collator and the interpreter would depend on the type of work and size of the installation.

If most key punch work is key verified, the ratio of punches to verifiers should be about 4 to 3. It is well worth the small additional monthly rental to install an extra key punch in the machine room for use in making over damaged cards instead of interrupting the punch operators. It can also be used by key punch operators during peak load periods.

A sufficient but not excessive number of additional control panels is desirable. A job done daily or weekly should be permanently set up. A job done monthly with a complicated control panel is often worth the cost of an additional board. Use of the semi-fixed or piggy pack control panels makes it possible to do several jobs with one control panel. Adequate storage facilities for these control panels is necessary. They cannot be left lying around or leaning against the wall because they are easily damaged.

For an installation that uses a large number of continuous forms, consider investing in a bursting machine. These are available in variable types that will detach any size form from 3½ to 17 inches. Decollators also have been very useful in some installations.

Office layout is important. Good lighting is essential because punched card work is hard on the eyes. Key punch operators should sit with their backs or left sides to the windows. Carpets on the floors and soundproofing on walls and ceiling of the key punch room are very

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MR. PETERS is president of the San Francisco Chapter of SPA. He presented this paper at a recent meeting of the San Francisco Chapter.

desirable to minimize the noise. A key punch desk should be provided for each punch machine because the working area on the machine itself is too small. Provide adequate storage space for work being processed. An open face cabinet with small bins will prove very satisfactory.

In the machine room the tabulators should be placed in the center of the room so the operator has the outside light to his back or side. Place the sorters and collators on the window side so it is easier to sight through a deck of cards. Place your storage files against the inside wall. The number of storage files should be kept to a minimum; if you are finished with the cards put them in storage boxes and transfer them to the dead storage area in the basement or attic.

Electric outlets and number of circuits must be surveyed carefully. Some of the machines require up to 10 amps. when starting.

Adequate space for orderly storage of card and paper forms should be provided close to the machine room.

Personnel and training—There are some differences of opinion on the best methods to follow. With a new installation we are always faced with the problem of training other employees to be machine operators. If the girl is not too old and wishes to learn key punching and has indicated she will remain with the company, I think you can afford to train her. Previous typing experience and knowledge of work to be processed are both valuable in this respect. Replacements or additions to your key punch staff are a problem. Experienced operators are hard to find and they command good salaries. Personally I have had more success with employing young girls just out of high school and sending them to key punch school while on my payroll. They are taught the work our way and do not have bad work habits developed by previous employers. This bringing in of juniors also enables you to move other operators up the ladder a notch.

With tab machine operators it is not so easy to train other employees, particularly with a new installation where machine knowledge is so important. With several operators required, half could be beginners and half experienced, but to have all beginners would be disastrous. Speaking of an established installation, I would prefer to hire a *man* with some machine experience and teach him the work. I do not think women generally make good machine operators.

Figure 1, entitled "Work Analysis Record" is a simple way to keep track of the jobs each operator can do. It is a definite aid to the supervisor in a training program. He can see at a glance if every job is covered by two or more people in the event of absence or vacation. The same idea can be used with key punch operators by double spacing each job, for key punching and for verifying.

For years many people had the mistaken idea that

WORK ANALYSIS RECORD

Job	Al Smith	Jim Brown	John Tate	Joe Werder
Close Cash Receipts	X	X	X	
Payable Vendors	X	X	X	
Close Audited Vouchers	X	X	X	
General Journal		X		X
Voyage Accounts		X		X
Monthly Employees Payroll	X	X		
Payroll Distribution	X	X		
Bank Reconcilation	X	X	X	X
Employees Earnings Records	X		X	
Quarterly Tax Reports	X		X	
Freight Abstracts		X		X
Commodity Statistics		X		X
Shippers Statistics		X		X
Consignee Statistics		X		X
Passage Order Ledger	X		X	
Passenger Waybills	X		X	
Passenger Statistics			X	X
Travel Agents Sales Statistics			X	X

Figure 1

punched card machine operators should be in the lower salaried brackets. In recent years there has been a marked change in this viewpoint and today most of us recognize that a good punch operator should be paid on a par with a senior stenographer and a good machine operator on a par with a senior clerk. A supervisor should be on a par with a chief clerk.

Design of cards—The card is the basic unit of the installation. It is the medium which actuates the various machines. Pertinent information is transcribed from original documents into the cards in the form of punched holes and it is important that the card be designed properly to give the maximum punching speed, least chance for errors and ease of handling in processing for reports. Lay out the card so the repetitive information will be punched in the left side. As the card is automatically fed into the punch this repetitive information

GUIDES FOR A WELL MANAGED PUNCHED CARD SECTION

1. Supervision
2. Proper equipment
3. Layout of equipment, files, etc.
4. Personnel and their training
5. Design of cards
6. Design of forms
7. Use of codes
8. Scheduling of work
9. Effective controls
10. Procedure manuals—wiring diagrams
11. Production statistics
12. Future planning of equipment
13. Periodic review of all work

is duplicated from a master card at greatest possible speed. Take full advantage of skipping procedure—it is faster than single spacing. By far the most important feature of card design is the sequence of the information to be punched. The card should be laid out so the key punch operator reads the source document from top to bottom or left to right. If her eye must jump around the source document it will slow her punching speed and increase the chance for errors.

Cards are printed with or without corner cuts upper left or upper right. They are printed in plain white, in solid colors, or with a color stripe on top, bottom or middle, also in various tinted stocks for use as card checks. Base cost is about $1.23 per M for plain white, with colored cards costing more. I have found standardization to be extremely helpful—plain white with upper left corner cut for all detail cards and upper right for summary cards. Striped cards on premium stock for name and address cards. Solid color cards with upper left corner cut for credits.

Design of forms—All the usual features of forms design apply to continuous forms for use on the machines. In addition we must remember the form must fit the machine type bars and other operating limitations. Forms with low usage are extremely costly because of high setup charges for printing. On certain types of forms the sequence of the information printed has a definite bearing on the operating speed of the equipment. The firms that can print continuous forms are limited and you must allow longer for delivery. Standard sizes are a must. Make provision for formaliner strips. Side stapling is desirable on forms of three or more parts. More than six copies is hazardous unless paper is very light or platens are very hard. This is particularly true on newer types of machines with type wheels pressing against the platen rather than bars hit by hammers.

For many reports I recommend use of stock or blank forms if usage is small. Also use stock forms for a new application and order printed forms after a trial period. Usage of stock forms will keep printing costs down and in many cases serve purposes adequately as well. Stock forms do permit changes in report setups whenever desired.

Codes should be used as much as practical. Alphabetical information takes up valuable card space and is costly to punch as well as to sort and process. Codes should be flexible enough to permit additions and still retain alphabetical sequence. Control over assignment of code numbers should rest with the tabulating section. Coding may be done by the originating department or by the tabulating section, whichever seems most practical.

In turning out reports be careful of too many codes making it hard to read unless the reader constantly refers to the code list. With proper planning, the code can in many cases be converted back to words through use of master cards, in the finished report.

Scheduling of Work in a punched card section is very important because of the expensive equipment. It is usually possible to get cooperation from the various departments to accomplish this. The important items with deadlines, such as payroll, freight manifests for a departing vessel, closings for the month, etc. would have top priority. Statistical reports, bank reconciliations, etc. would be scheduled for the in between dates. The important thing is to have a *schedule* and stick to it as closely as possible.

We use a simple form that we refer to as a "Monthly Calendar and Check List." The idea there is, make up by typing or ditto, blanks for several months at a time. The supervisor has one under a clip board and as the job is finished and sent out he draws a line through that item. It also permits him to check on jobs coming up during the next day or so to see if the source documents have reached the key punch section. With all jobs listed on the calendar it is very unlikely that any will be overlooked. This arrangement has worked very satisfactorily in our installation handling several hundred different reports each month. Under work scheduling, I would also like to mention how I think the work should be divided among machine personnel. I believe in the work unit idea—that is, give a man certain jobs as his primary responsibility and let him handle all phases, balancing, sorting, collating, wiring control panels, tabulating, etc. Once a year or every two years, rotate the personnel in their primary responsibilities. You will build your personnel this way. I do not believe in keeping a man sorting all the time or collating all the time, etc. unless possibly you have a very large installation with tremendous card volume.

It is very dangerous to try and take on more than one

FORM NO. M-153 (15M6895-253)

TABULATING REPORT

MATSON NAVIGATION COMPANY

DEPARTMENT _____ OPERATION _____

DATE

TIME SOURCE DOCUMENTS RECEIVED

PREPARATION OF CARDS	START	FINISH	TIME (MINUTES)	OPERATOR
PUNCHING				
VERIFYING				
TOTAL TIME				

NUMBER OF CARDS PREPARED

	CONTROL TOTAL	TAB TOTAL

CARDS FILED BY

REMARKS

FOR TABULATING DEPARTMENT USE ONLY

DATE _____

JOB CODE _____

CODE TIME (IN MINUTES) _____

PUNCH AND VERIFY TIME (IN MINUTES) _____

KEY PUNCHED CARDS PREPARED _____

REPRODUCED CARDS PREPARED _____

Figure 2

new punched card job at a time. There is so much planning involved that your chances of building a successful installation are much better if you put it together one job at a time.

Controls are another important item. It means the results or final reports will be accurate. The originating department should furnish a control total with each batch of documents but where this is not done, the tabulating section should set up a control total immediately upon receipt of the batch of documents.

Figure 2 is a Tabulating Report form. A form like this, used by all departments in sending work to the tabulating section, provides a uniform control sheet. It also has a perforated strip on the right side which is used for production control within the tabulating section. In addition you can use the back of the control sheet to record the machine total of the batch of cards when they are proof balanced. Another phase of control is airtight control of confidential information such as payroll or salary data. Work utilizing this type of material would be restricted to the senior operator; confidential cards or other material should be kept under lock and key.

Procedure manuals and wiring diagrams rate high on my list of musts for a successful punched card section. If the operations are properly planned and the procedures coordinated, the machines will do most of the work.

I consider it well worth up to half the time of the supervisor to maintain procedure manuals and wiring diagrams. This investment in time of the supervisor is well repaid when you consider how many reruns and account errors are eliminated. The time of both the operator and Supervisor is saved because very few questions are unanswered in the procedure.

Production statistics—I believe in only a very simple production record within the tabulating section. The control sheet discussed above is used to record coding minutes, key punching and verifying minutes, the number of cards punched and the job number—all on the perforated slip. The machine operator allocates his time by department only. We summarize at the end of each month by department for whom work was performed, cards punched, coding hours, punching and verifying hours and machine room hours. Distribution of costs, if necessary, can equitably be made on a total hours basis. To keep detailed records of time on each machine costs much more than it is worth. Total cards punched against total time gives you an average rate per hour. Total time against total available time gives you the percentage of available time used productively. Occasional logs are maintained on particular machines when there is any indication they are overloaded.

Future planning of equipment is in the hands of the supervisor. He should keep himself informed through sales representatives of equipment firms, trade magazines, membership in professional associations and visits to other installations. Long range planning is essential to the continuing successful operation of a tabulating section, particularly because it takes so long after ordering to get equipment delivered.

Periodic review of all work performed by the tabulating section should be undertaken at least once each year during which time many things can happen. The volume can change, or the complexity, importance or other factors influencing the decision as to whether the job belongs on punched cards or not. Don't be an empire builder. Eliminate unnecessary or overly costly jobs and you have a much better chance of keeping a continually successful punched card section. **s/p/a**

Photocopying Speeds Production Control

DECENTRALIZED production control has enabled North American Aviation Company to process over 50,000 departmental order copies each week and to exercise a tighter control over progress and routing of production orders. Production control bottle-necks have been opened with the adoption of this new improved system, using 23 fast photocopying machines, which are installed in some 20 departments throughout the Los Angeles and Downey, California, plants. Principal objective of the new notification system is to reduce the effort involved in transmitting information between manufacturing and assembly departments.

Under the old system, this production information was passed along by follow-up personnel, either by verbal contact or manual copying of the production information. Now, instead of the inquiring department asking, "Where are my parts?" the responsibility is fixed, so that the "upstream" department must notify the "downstream" department if any delays occur.

By this new method, most of the legwork of the follow-up man, stock chasers and troubleshooters has been eliminated because the photocopy form acts as the follow-up. It is estimated that under the old procedure, the average follow-up man travelled about 8 miles a day in a single shift around the plant. Now, the photocopy form eliminates this manual follow-up.

—HELEN R. WILSON, in *Office Management*, Feb., 1955

Starting

Procedures and Systems from the Ground Up

by Vincent P. Connolly

This article is based on the author's activities at the Portsmouth, Ohio Atomic Energy Commission project.

Mr. Connolly wrote:

"Not too long ago I was faced with the problem of having to prepare a complete set of procedures for an organization that had to "explode" into being. There was no time, nor personnel to have the job done by others than various department heads, most of whom had neither training—nor inclination for the chore.

"Where to start?

"The enclosed manuscript is a compilation of bulletins which actually worked under unusual and trying conditions. It is submitted with the idea that it may be helpful to others. The examples are included to help those who are not self-starters. Under the above conditions I found them necessary."

THE complexity of modern commerce and industry demands reducing the formulae for doing business to procedures. That fact is as generally accepted as it is incontrovertible. No longer is an organization chart a self-sufficient instrument. Today it's not much more than a blue print for the chain of command—the map that is inserted in the back of the book.

What is being done, or what is to be done within a business? By which components? Where, when and how? What are the relations of one component to all others within the frame of the entire organization? What establishes routine relations with purveyors on one hand and customers on the other? What sets up the orderly sequence of operations and processes in plant, offices and branches? How are subcontractors qualified and how are their performances checked?

Shall we run through the entire litany of questions applying to any business or any particular phase of its operations; office, plant or branches? The answers to all of them should be found clearly, concisely and unmistakably in procedures.

In the normal course of every day business only deviations from the norm should require routine attention of administration and supervision. The majority of operations. properly established in procedures, need no time-consuming and costly delays for relatively unimportant decisions. Well planned and followed procedures allow time for thinking—time spent, in too many instances, shuffling papers or "quibbling over the minutiae of detail."

It is comparatively simple to follow a piece of metal

This is the first installment of a comprehensive article on establishing a systems and procedures department.

through a series of operations and assemblies from the stock room to the shipping department. But, the "paper mill" is another story. Forms and reports increase and multiply and distribution lists are expanded to include the office cat. Mr. Bigdome and all the Littledomes scream to have their names on every distribution list. That's one way of keeping the name in circulation! Eager Beaver Joe or Mary sells his or her supervisor on the idea of a new form. The suggestion shows they're "on the ball". Now someone suggests a "rider" on the form, and a compilation, and a report and a memo of transmittal. New routings are established and the first thing we know, we need more job classifications and more help to baby-sit the brain children of all the eager beavers and beaveresses. The confusion gets confounded—and compounded. All because there was no procedure, or if one existed it was toothless.

A sudden demand for a tab report by the executive committee of a large steel mill confronted its comptroller. The chore, accepted as mere routine, revealed that the Tab Department on three shifts was working just about to capacity. Investigation showed that any employee in the organization on the level of supervisor could requisition a machine tabulation job and the tab accountant had no discretion, only a squawk, about taking it on. The Tab Department issued a weekly report of its activities which listed all the reports it compiled. Unaccountably, that report stopped at the desk of an assistant in the comptroller's office where it was filed. Simply filed.

The comptroller took some drastic measures. All tab operations that did not concern fiscal transactions were let pile up. No distribution was made until the reports were missed and requested. Of a total of 203 reports, 82 were *never missed!* Compilation and distribution of them were discontinued. Thereafter, report requisitions had to be screened, justified and signed by a department manager.

The reports of the Tab Department no longer were "noted and filed". This company operated with several volumes of procedures, alleged procedures, perhaps we should say, because they were vague, loose, moth-eaten and subject to amendment by whim, by memo or by gosh. The Accounting Division was responsible for getting them together and "What does a bookkeeper know about personnel, planning and scheduling, procurement, shop practice or anything else except bookkeeping"! (Sound familiar?) There was no provision for policing what the company had. Actually in this case, procedures were the traditions of the old hands.

Difference Between Policy and Procedure

Policy is a broad expression of the principles governing the entire operation of a business, or a selected feature of it, or a project, and the interpretation of these principles, subject to executive aproval, by the heads of units, departments or divisions. The breadth and limitation of delegated interpretative authority is established at the top level of management.

On government work, policy may be dictated in whole or in part by a government agency which may establish items of policy by government regulations or the terms of the contract. In such instances, policy and procedures for its application must coincide or interlock with requirements which have been established outside the jurisdiction of the company.

Policy is generally a written declaration, as it should be, although certain features of policy may exist only in the communal mind of top management. A hostile, or a defensive attitude towards labor or a parsimonious attitude in various phases of employee relations may not be reflected in a published policy; and again, published policy may declare in favor of small business or local business whenever possible, and actual policy, internally accepted policy, may dictate limiting business relations to a certain list of purveyors.

Policy and procedures, although closely related and interdependent to a certain extent, are not synonymous. A policy may be adopted, for example, to maintain a materials inventory not to exceed one million dollars. A procedure for material control would interpret that policy and convert it into methods for keeping within that limit, with consideration, too, of possible but foreseeable expedient deviations.

In most procedures, most certainly in every case where justification may be found, a declaration of policy should form an introductory paragraph. "The policy of this department is to————" or "The policy of Management governing operation of this department is ———," gets a procedure off to a self-writing start. (Please note, the fact is accepted that not *all* procedures can start with a declaration of policy.)

What Is a Procedure?

A procedure is a definition of the functions and responsibilities, and the processes for operation of any

business or of any component of a business, within itself and in relation to all other components.

A procedure specifically prescribes:

1. What work is to be performed by the various participants.
2. Which are the respective participants.
3. When and where the various steps in the different processes are to be performed.
4. The sequence of operations that will insure uniform handling of recurring transactions.
5. The "paper" that is involved; its origin, transition and disposition.

Necessary appurtenances to a procedure are (a) detailed organization chart, (b) flow charts and (c) exhibits of forms, all presented in close proximity to the text of the procedure.

A procedure is not written merely to satisfy an arbitrary requirement, nor is it written under compulsion solely to have a procedure. (Sometimes a definition helps to point up the original word. Here, would it help to clarify the need for an established procedure by thinking of it as an expressed reason or justification for the very existence of a unit, a department, or a division, and the organization within it for performing its functions, including standard practice for its operations?)

Writing a procedure is secondary to *establishing* one. The written word is solely to communicate to all who may be concerned just what has been approved as accepted practice. When improved methods are developed or expediency dictates changes in procedure, even for trial periods, the procedure should be amended to incorporate the changes. At all times, the written procedure and not deviations therefrom, even when tacitly accepted should govern operations of a unit, department or division. Directives or memos (and sometimes a succession of them, amending amendments to amendments!) irregularly changing an established procedure defeat its purpose. A procedure at any time should be subject to audit for accuracy, completeness and compliance.

How To Start

A procedure starts with a definition of the duties and responsibilities of a functional component of a business. Logically then, duties and responsibilities are positioned at the beginning of a procedure, following an introduction under the heading of Policy, when that is possible.

Under the heading of "General", or better possibly, "Functions", or "Duties and Responsibilities", proceed to list and describe the functions of the unit. They should be presented with unmistakable clarity and completeness—listed tersely, if a narrative form loses its conciseness, or becomes too involved to follow readily.

Although at this point no reference is made to any unit sub-divisions that are going to accomplish the work, duties and responsibilities should be presented in an order that will correspond with their appearance in succeeding sections of the procedure in which will be prescribed where the duties are to be performed, by whom and when.

VINCENT P. CONNOLLY studied at New York University and the University of Chicago. He served in the Chemical Warfare Service during World Wars I and II. Mr. Connolly has worked in private industry as well as for the U. S. Government. He is now in charge of procedures for the Portsmouth Ohio Atomic Energy Commission Project.

Duties, responsibilities, or functions indicate action—performance. And performance is not indicated by naming a piece of paper. Witness a negative example:

1. The functions of the Personnel Division . . . will be as follows:
   A. Personnel Requisitions.

The function is not requisitions; it is to do something about them. Does the Personnel Division originate requisitions? Would it not be better to specify the function?

1. The functions of the Personnel Division . . . shall be:
   A. To receive and process authorized Personnel Requisitions.

The statement tells us something; a duty is clearly and concisely pinned down to one place for performance of a definite function.

If duties, responsibilities or functions are listed in a column, each item in it when combined with the introduction should make a smooth, complete, and grammatically correct sentence. Thus, "The functions of the Personnel Division . . . shall be to receive and process authorized Personnel Requisitions".

Here is a good, followable example of a GENERAL Section:

1. *BUDGET CONTROL**
A. *GENERAL*
(1) The functions of the Budget Control Division of the Budget, Cost and Progress Department are:
a. To prepare the over-all Project Budget
b. To maintain Budget Control
c. To prepare Budget Reports

* Hypothetical example

Please note the definitiveness of "over-all Project Budget". Without the inclusion of the words "over-all" and "Project", "Budget" by itself, would permit misinterpretation. There would be no answer to the question, "What Budget?" It was not considered necessary again to describe "Budget" in the several succeeding items, because the reader knows application is for the budget for the entire project. He had been told so. Too often, the procedure writer presumes that others will read into the text some essential facts that have not been written. There is no place in a procedure for "reading between the lines".

Enumeration of functions stops right at that point. Development of the functions in detail will follow along in the logical place.

Organization

Under the general heading Organization, there should be a listing of the functional groups responsible for performing the duties specified under GENERAL. No attempt should be made to leap into details of processes, sequence of operations and paper flow until the organization that is going to do the work is set up.

Follow through with that "Budget" business: The responsibilities of the Budget Control Division have been pinned down. Each of those functions will be performed by a group of specialists. The next section of the procedure will tell us how the Division is broken down into working components.

B. *ORGANIZATION*

(1) Budget Preparation Branch
(2) Budget Control Branch
(3) Budget Reports Branch

A set of obligations has been assigned to the organization responsible for them. The next step is to set up sections within the procedure to tie up each function with the branch which is going to do the work. Here is the spot where the gears of the Division under consideration must be made to mesh with those of other divisions, and to cause them to operate smoothly in relation to those of its own and all other departments and units. Space will not permit developing the operation of all three branches, nor is it considered necessary. Let's settle for the first one!

C. *BUDGET PREPARATION BRANCH*

(1) Budget Preparation

a. The basic information on which the Budget shall be prepared shall be furnished by the various unit managers on unit managers' Budget Estimate, Form No. ———. These estimates may be submitted at the end of regularly prescribed intervals, or at such times as they may be considered necessary by the general manager. (Reporting intervals have not been decided on as this procedure is written. When this information becomes available, it will be made part of this procedure, and will appear in the Appendix.)

These estimates shall show the amounts of money requested by the respective managers for administration and operation of the departments under their control for a predetermined period of time designated by the general manager. They shall clearly set forth the functions to be performed as well as the estimated cost thereof.

These estimates shall show the rate at which the monies will be expended. They shall be supported by justifications prepared in sufficient detail to establish the need for any item. Detailed lists of personnel, designated by classification, shall accompany the estimates.

b.The Budget Preparation Branch shall compile these budget estimates into an over-all Project Budget Estimate. It shall investigate the validity of the various items, and shall correlate all pertinent information, translated into terms of dollars, to be included in the Budget Report for the general manager.

The Budget Preparation Branch shall record and adjust any changes in the Budget that may be made by Management.

The revised and approved estimates shall constitute the Project Budget.

The Budget, as adopted by Management, shall be filed with the Comptroller. Sufficient copies of the portions thereof applicable to the Units under their control shall be transmitted to the Unit Managers. Each Unit Manager shall adhere strictly to the items and amounts of money provided for him. Changes in budget provisions may be made by Management on written request of a Unit Manager. Amounts of money may be transferred from one appropriated item in the Budget to another appropriated item in the Budget, or to a new item, when approved by Management.

(2) Organization

a. The Budget Preparation Branch shall be under the immediate supervision of a senior engineer, who shall be responsible to the division chief.

b. This branch shall be divided into as many sections as may be necessary to accomplish the work. Each section shall be under the direction of a supervisor with the classification of engineer.

A Revision for Comparison

The preceding example might be accepted as a satisfactory narrative presentation of the responsibilities of a Budget Control Division. It falls short of the ideal, how-

ever, by placing more emphasis on what material the Division will receive, important as that may be, than it does on its responsibilities, and on what the Division shall do with what it gets.

That example is a distinct improvement on some of the products of loose, incoherent, confused and confusing thinking and writing that characterize some procedures. But are the delineations of duties too broad? Do they permit misinterpretation? Could not the duties be pinpointed? Does the example suggest htat more diligent research would uncover implied responsibilities that should be spelled out? Does it leave too many questions unanswered?

A more thorough preparatory research might suggest a change of title for the Division as well as a slightly different concept of its functions, both of which are reflected in the following example:

*I. BUDGET COST AND PROGRESS CONTROL DIVISION**

A. *GENERAL*

(1) The Budget, Cost and Progress Control Division shall direct and coordinate the activities of the various units, departments and divisions in the formation of the budget; establish the budget, maintain budget, cost and progress controls, and prepare and distribute budget and cost and control reports. It shall have the power, and it shall be its duty, to investigate the administration of the units and their subdivisions, including the organization thereof, the duties of the various positions, the methods and practices employed, and the standards of efficiency maintained, for the purpose of recommending to Management such changes that will improve and facilitate economical planning and operation of the project.

It shall be the duty and the responsibility of each Unit Manager to provide the Budget, Cost and Progress Control Division with any and all information and assistance required in the conduct of all necessary investigations.

(2) The Budget, Cost and Progress Control Division shall be responsible for:

a. Receipt, compilation, investigation and presentation of the budget to Management, and for its revision in accordance with Management's direction.

b. Receipt, interpretation, and investigation of information concerning the administration of the budget by the respective units, departments and divisions.

c. Reporting to Management for the administration of, or any deviations from, the terms of the Budget.

d. Receipt, compilation and investigation of construction cost reports from the operations unit, and the comparison of reported costs with estimates for the features of the project and the various types of construction contained therein.

e. Receipt, compilation and investigation of Progress Reports from the Operations Unit, and the comparison of reported progress with scheduled progress for the features of the project and the various types of construction contained therein.

f. Presentation to Management of periodic reports on cost and progress, directing attention to any deviation from or discrepancies in estimated costs or scheduled progress.

g. Preparation of appropriate charts, graphs, and other material supplementing such reports.

B. ORGANIZATION

(1) Budget, Cost and Progress Control functions shall be accomplished through the following branches:

a. Budget Preparation

b. Cost and Progress Control

c. Special Studies and Reports

(The second installment of Mr. Connolly's article will appear in the August issue)

* Hypothetical example (Constructional Project)

10 Ways to Control Office Production

1. Use colored tabs or stamps to differentiate work assigned within weekly periods.
2. Have all work kept on desks.
3. Issue weekly unfinished production reports.
4. Analyze all reports and compute the man-hours required to process them.
5. Compute a production-index related to man-hours.
6. Set up a system of priorities for certain reports.
7. Study each routine for possible application of machine methods.
8. Use simplification studies to reduce non-essential details.
9. Standardize methods.
10. Control the volume of work flow.

HARRY L. WYLIE, *American Business* Jan. '55

How Mechanization of Accounts Payable

saves time, energy and money for a hotel chain

by Andor Beretvas

OUR ACCOUNTS payable has been handled, for many years, through a voucher system which centers on formal recognition and approval of all cash disbursements. The voucher register is not used as a cash disbursement journal, but rather it is a journal for accumulating and posting the data recorded on the vouchers. Our organization handles the centralized purchasing of hotel supplies and administers the operations of the hotels included in the chain.

The auditing involves several steps in checking vendor's invoices. This checking must be made against:

(a) Purchase orders, which are prenumbered and which cover either materials or services.

(b) Receiving tickets, which have been mailed in by the hotel managers.

(c) Prices, terms and quantities. Utility bills are treated like vendor's invoices. Requests for payment are handled in a similar way and they are used for traveling expenses, licenses, permits and taxes.

In connection with the distribution of expenses a coding chart was established, and the following general procedure applied:

1. *Coding by properties.* A code number has been assigned to each property. Vendor's invoices, utility bills, licenses, taxes, advertising (highway signs), insurance, expense reports and other expenses have been marked with the respective property code number. Where no property is indicated or properties too numerous to allocate charges, the expenses were debited to the Home Office. This principle was also applied to prepaid insurance.
2. *Sorting of invoices.* The invoices are sorted by property number, and coded, in the same order as the properties are listed in the voucher register.
3. *Formal Approval.* All invoices must be approved for payment by the hotel manager and checked by the voucher clerk for possible duplication or re-billing before being entered. No statements are to be entered even if approved.
4. *Repair and improvements.* Repair bills and leasehold or building improvements (except if marked as an emergency) have to be checked against work authorization and attached to the invoice.
5. *Employees' purchases.* In those cases where invoices are received for employees' purchases, proper checking should be made by accounts payable clerk to see that the company is reimbursed in the proper amount, and the money order stub should be attached to the bill, before passing it for payment.

MR. BERETVAS is comptroller, secretary and treasurer of Hickory Hotel Co., Inc., Chicago. Before joining this company, he was internal auditor at General Finance Corp., and before that a senior staff member of Peat, Marwick, Mitchell & Co. He received his graduate training in business administration and economics at the University of World Economics at Vienna, Austria and at the University of Southern California, Los Angeles.

The young lady seems more relaxed in the photo at left. It's probably because she is taking care of Hickory Hotel Co.'s accounts payable with a fast, clean mechanized system. Photo below has all the props needed for the *old* accounts payable routine, including the grim-faced clerk.

6. *Handling of vendor's statements.* All balances shown on statements must be reconciled with open invoices listed for the company in the voucher register. Wherever a discrepancy occurs a letter will be sent to the manager to investigate.

7. *Grouping of the vouchers by due dates, and establishing preference paying plan.* This includes the fulfillments of the discount terms indicated on the invoices. Utility bills (gas, water, electricity) should be checked for net terms, and the last discount dates, to see that all charges recorded for payment are for current service in line with the amount paid for the same service in previous months. In some instances arrear charges appear on new bills. Telephone bills have to be checked for advertising, local and long distance calls, and for red credits on long distance commissions. Notes, mortgage payments, installments are processed from a card file and request for payment slips are used as vouchers. Breakdown of the principal and interest has to be made for each payment. Final payments are special check marked. Properly approved expense reports are used as vouchers, and supporting evidence is attached.

8. *Typing of checks.* After invoices have been recorded in voucher register in the correct account, and the voucher number is written on the invoice, it is filed in the invoice filing box for typing. All invoices are filed alphabetically.

9. *Mailing of checks.* When checks are sent out, all local accounts are mailed to the hotel manager for distribution. Utilities, mortgage payments, expense checks and Chicago suppliers are mailed direct.

10. *Red Checks.* Returned checks are cancelled by issuing a "red check", which is recorded in the voucher register in red, using a new voucher number, but keeping the original check number. The reason for cancellation has to be shown on the lower portion of the red check.

11. *Journal entries.* In any case where an invoice has been entered in the voucher register and posted to the ledger (prior to the current month) and has been paid by the hotel as a pay-out, it is then necessary to reverse the expense in order to balance the open accounts with the ledger. This is done by crediting the expense account and debiting accounts payable. This procedure is followed by partial payments and by returns. *(Continued on Page 22)*

PROPERTY # 11

EXHIBIT I, HOTEL

CHICAGO ILL

MEMO.		DATE	EXPLANATION	SUB A/C	CHARGES	CREDITS	BAL. DUE	PICK UP	VOUCHER #
		JUL-8-54	FWD		0 1599.18	A *	*1,599.18	1,599.18	E - •
	1	JUL-8-54	— K	2 5	18.00				E -223
HOTEL SERVICE EMPL. ASSN. DUES	3	JUL-8-54	— K	3 5	94.14				E -224
LAKESHORE REFRIS		JUL-8-54	E-B —	3 1	2200.00	B4			E -225
EDWARD GRAPE		JUL-8-54	— K	5 0	46.25				E -225
JULY		JUL-8-54	— K	3 5	32.54				E -226
AIRCOND SERV. 11876		JUL-8-54	E-C —	3 1	238.97			9,000.00	E -227
MEYER-ROSIN		JUL-8-54	— K	5 0	11.03		10,240.11	1,240.11	E -227
JULY		JUL-8-54	— PAID			*318.08	*9,922.03		E - •
5306		JUL-8-54	— PAID			*200.00			E -178
5312	10	JUL-8-54	— PAID			* 38.30			E -176
5320	11	JUL-8-54	— PAID			*427.37			E -219
6321	12	JUL-8-54	— PAID			* 13.75			E -188
5344		JUL-8-54	— PAID		C4	* 30.25	*9,212.36	9,212.36	E -203
5362		JUL-8-54	— PAID			* 27.00			E -173
5427		JUL-8-54	— PAID			* 27.00			E -172
5428		JUL-8-54	— PAID			* 27.00	*9,131.36	9,131.36	E -207
5429		JUL-8-54	— PAID			* 18.00			E -223
5512		JUL-8-54	— PAID			* 32.54			E -226
5515		JUL-8-54	— K	4	390.94	B4			E -228
ILL. BELL TELEPHONE		JUL-8-54	— J	8 1	428.54				E -228
-"-									
5530	22	JUL-8-54	— PAID		C4	*819.48	*9,080.82	9,080.82	E -228
	23	JUL-8-54	— FWARD		D	9080.82	* 0.00		E - •
	24								

PRESS OF THE NATIONAL CASH REGISTER CO. DAYTON, OHIO 1527

E-31-B	2200.00	K-25	18.00
E-31-C	238.97	K-35	126.68
J-81	428.54	K-50	57.28
K-4	390.94		

PROPERTY EXHIBIT II

CONTROL SHEET

MEMO.		DATE	EXPLANATION	SUB A/C	CHARGES	CREDITS	BAL. DUE	PICK UP	VOUCHER #
	1	MAR18-55	E-B	3 1	2200.00				A - •1
	2	MAR18-55	E-C	3 1	238.97				A - •2
	3	MAR18-55	— J	8 1	428.54				A - •3
		MAR18-55	— K	4	390.94				A - •4
		MAR18-55	— K	2 5	18.00				A - •5
		MAR18-55	— K	3 5	126.68				A - •6
		MAR18-55	— K	5 0	57.28		*3460.41		A - •7
	10								
	11								
	12								
	22								
	23								
	24								

PRESS OF THE NATIONAL CASH REGISTER CO. DAYTON, OHIO 1527

Exhibit I, above—pick-up balances on a Hickory Hotels Co. property card. Exhibit II, left, is a control sheet.

12. *Balancing the voucher register*—at the end of the month, before posting.

(a) Check numbers are recorded after voucher entry. At the end of the month each check must be given a voucher number and recorded as paid, in order to balance.

(b) Each property in the voucher register must have a "total" for the month of the voucher entries. The grand total of these totals, plus the open balances at the beginning of the month (taken from the previous month's reconciliation sheet), less the total open vouchers equals the accounts paid for the month.

Trouble spots at the end of the month are found in the balancing of the voucher register with the general ledger, which has always been a time-absorbing element, and many difficulties have been encountered.

By installing National Cash Register Co. equipment all these troubles have been eliminated. This machine has a "major" and "minor" key system. The major keys consist of the following:

Assets:	A — Cash accounts, receivables and inventories.
	B — Prepaid items.
	C — Fixed Assets.
	D — Deferred charges.
Liabilities:	E — Accounts and Notes Payable.
	F — Accrued expenses.
	G — Reserves.
	H — Capital and Net Worth.
Income:	I — Income accounts
Operation: Expenses:	J — Room, Food and Beverage expense.
	K — Administrative and General expense.
	L — Capital gain and loss, Federal and State Income Taxes.

The minor keys are used for a more detailed classification. The machine was adapted to our system in the following way:

The first step in our operation is the clearing of the machine. It is set into "total" position. The clearing is followed by posting of the "pick-up" balance on the property card (for each property a separate card and control sheet is used), as shown on the Exhibit I, under "A" items ..... $ 7,599.18

In this sample case "B" items represent debit vouchers (see voucher columns E-223, 224, 225 etc.) 3,460.41

$ 11,059.59

"C" items refer to the payments marked as "paid" under credits 1,978.77

After the posting for the day has been completed, the machine is put in "total" position, and leaves a balance due for next day's pick-up, marked as "D" ..... $ 9,080.82

Exhibit II shows the control sheet, where the grouping is made by "major" keys.

Journal entries are handled through the "adjustment" key. Red checks are processed by major key with "correction minus" and "correction plus", and with "paid'. Figures in excess of $10,000.00 have to be split up and shown in two amounts.

By using the machine, one week out of each month can be saved by eliminating the unnecessary tracing of open vouchers. The entire procedure is neater, cleaner and eliminates handwriting. No heavy books have to be lifted and moved; only small cards are used. The outstanding balances on each property can be established within a few minutes. It is serviced once a month and this seems to be sufficient. No breakdowns have occurred up to now. The operation of the machine is simple, can be learned in a few hours and no special training is necessary.

By this procedure we found that our accounts payable system has been improved and the mechanical system is considered more economical than the previous manual way. **s/p/a**

Worth Reading

"Manhour Budgeting for Control of Clerical Costs"—James L. Brownlee, *NACA Bulletin*, March 1955.
Describes the procedure for establishing standard manhours and setting up time budgets for execution of measured tasks.

"The Work Sampling Method"—Merle Steward, *The Office*, October 1954.
Illustrated non-technical discussion of how to plan and operate a work sampling survey.

"Work Simplification Aids Mail Order Operations"—Charles Faulkner, *American Business*, Dec. 1954.
Describes unique combination of address plates and offset printing used for producing a master list of items offered for sale as well as for other purposes. More than 60,000 plates may be cut during a busy season, none of which are reused, (except for frames) because it is cheaper to cut new ones. A service bureau is used to prepare the plates.

"An Assembly Line Approach to Accounting Operations," *Management Methods*, January 1955.
Detailed description of Westinghouse Electric's method for centralized processing of 1,500,000 invoices to 18,000 customers annually. A unique loop type of assembly line is used for getting the data on tab cards.

Why Not

One Annual Meter Reading — Averaged Interim Billing?

by R. J. Neubert

Editor's Note: The following article is being printed for its thought provoking ideas on a major problem of the utilities industry. We are not in a position to evaluate the merits of the suggestions made here, but they may offer ideas of practical value. If Mr. Neubert's article generates a little discussion among methods men in this field we will be pleased. The author is an accountant for The Northern Pennsylvania Power Co., Towanda, Pa.

PRESENTLY, monthly or bi-monthly billing of residential electric consumers relies upon the well-geared machinery of meter reading, bill rendering and customer accounting work for the prompt invoicing of kilowatt hour consumption. If it were not for the considerable substitution of mechanical processes for manual work, the electric service rate would have to absorb a greater amount of the billing overhead expense. Even as it is, a good deal of money goes into the preparation of the monthly or bi-monthly bills which could be saved if meters were read only once a year and estimated bills, based on this reading and previous records, furnished for the remainder of the period.

The following advantages appear important enough to merit further investigation of the feasibility of this proposal:

(1) Marked reduction in the number of meter readers needed to read consumers meters because this work would be necessary but once a year;

(2) Elimination of a similar number of cars presently required to transport those meter readers;

(3) Decreased billing overhead expense because of simplified billing operations.

(4) Collection sheets for the use of meter readers would be needed merely once a year;

(5) Meter books would not have to be written up as frequently as nowadays;

(6) Decreased number of special bills required to correct errors in meter reading or billing;

(7) The monthly revenue would be uniform. Because of it, there may be a possibility of earning interest on increased revenue during the months of decreased consumption.

A gradual change-over from the present to the proposed method is indicated, and it is this characteristic which makes the adoption of the new billing procedure attractive. In fact, the period of transition could be extended over one entire year. Also a limited number of routes could be singled out for experimental purposes.

In its regulations the utility would simply state that residential consumers' consumption would be billed on an annual basis; that is, actual readings would be obtained once a year. Monthly or bi-monthly billings would be based on a predetermined, averaged charge based upon prior year's experience except for the period when a reading would be available. In billing the consumer at that time, the sum total of the averaged kilowatt hours would be subtracted from the annual consumption and the consumer billed for the difference.

Familiarize Customer

At the proper time it would be advantageous to secure the consumer's coperation by familiarizing him with the plan. The possibility of eventually passing some of the gains to be realized on to the consumer may be held before his eyes as an inducement toward wholehearted cooperation.

Once a schedule has been set up according to which meter reading routes are to be switched over to the new arrangement, the work of determining the annual consumption of the past year to be used as a basis for establishing the monthly or bi-monthly averages will have to get under way in the same order. If the first routes to be billed according to the new set-up were last read, say, early in January, then the first averaged bi-monthly billings should be ready for mailing at the beginning of March. Hence, this work could be started as soon as the last meter reading had been taken. For quick reference, annual consumption and revenue calculation tables, also showing monthly and bi-monthly averages (rounded up or down as may be deemed advisable) should be prepared in advance.

The information to be furnished the billing center would be made available in the same way as it is being done in the case of municipal street light charges; that is, by listing the monthly total in one of the columns of the meter reading book. This information would be punched by the key punch operators into the accounting cards but once for later on it could be duplicated automatically. Since simplified accounting cards could be used for billing purposes the greater part of the year, economies are indicated in the number of key punch operators henceforth necessary as well as employees checking their work. Also, use of the extension section and the master cards would be a fraction of what it is today for they would be required only in connection with the annual billing adjustments.

Nor would route books have to be forwarded to the billing center for purposes of rendering averaged periodic bills because all essential information already would be punched upon the advance cards held in readiness for the next billing cycle. Only in case of changes as to name, address, interim adjustment of billing, discontinued customer service, restoration of service, new customers, etc. would the route books be needed.

The averaged monthly or bi-monthly bills will pass through the collection and bookkeeping sections of the customers' accounting office in the same way as before. The office records, too, will be treated in the same manner as presently taken care of.

As the change-over from the old to the new gets into high gear, thoughts will have to be directed toward the time when the first annual adjustments become due. Whatever can be done to level off peaks of work ahead of time to insure an even flow of activities should be so arranged.

Preferably, the determination of the total annual kilowatt hour consumption charged according to the averaged bills for purposes of establishing the deduction from the annual consumption figure may be left up to the Billing Center, for it is especially well fitted to attend to this matter. This information could be carried forward by key punching from one accounting card to the next and therefore would be available at the time of the annual billing adjustment. Appropriate printing on the annual bills would provide space showing the total annual consumption, the total annual averaged consumption already billed and the difference between the two as basis for the adjusted billing. At the same time, the averaged monthly or bi-monthly billing for the next year could be shown. This information would be valuable to the Billling Center as well because they would use it as the charge to be punched into the accounting cards for next year's billing.

Peak Billings Levelled

In view of the fact that annual adjustments are being staggered over one entire year and because interim billings are being averaged, peak billings are levelled off and, by the same token, low revenue months are being improved upon. Of course no averaging of periodic charges will prove so accurate that it will represent the actual monthly or bi-monthly fraction of the annual bill. There are bound to be fluctuations—increases and decreases in consumption—which cannot be anticipated. The consumer should be informed that he is to notify the electric utility if an extraordinary change has taken place so that an adjustment may be made, provided such a change does not occur close to the end of an accounting year. It is being hoped that interim adjustments may be held to a minimum.

It will be seen from the foregoing that the organiza-

tional and mechanical requirements of the proposed change can be carried out without undue difficulty. Yet certain minor disadvantages are being encountered which, as will be noticed, are not of a seriously detrimental nature.

One benefit of the meter reader's work would be lost except once a year; that is, his attempt to collect past due accounts. Present records undoubtedly indicate to what extent or percentage collections were obtained in this manner. The question arises as to whether direct-mail dunning may prove equally successful. The answer will be furnished by the quarterly write-off of delinquent accounts. It is felt that the effectiveness of one method of collection as compared with the other will have no bearing on this final result.

It may not be possible to undertake meter book surveys as frequently as under the old set-up if discrepancies in consumption called for an investigation. However, special checks by field auditors would be continued in the same manner as under the present system and perhaps could be enlarged upon if found advisable.

The annual consumption figures could be relied upon only to assess the trend in kilowatt hour sales. Determination of the number of consumers served, however, would be just as easy as at present.

From the foregoing discussion it appears that the prospects of realizing considerable economies are good. Exhaustive studies will be needed, however, to furnish definite figures and conservative estimates before a final decision can be reached in this matter. **s/p/a**

A Manager's Stake in Systems

#3 in a series by Leslie Matthies

Systems Pins Down and Measures

PAPER WORK problems are misunderstood as often as they are understood. People try just about every approach to "solve the problem."

You're familiar with expressions like: "Costs have to go down. Cut 'em 10%", "Too many copies", "We've got to get some efficiency around here!", "Let's change it again", and many others in like vein. They reflect the infinite variety of approaches people take to lick the administrative control problem.

People using these approaches are fighting symptoms. And nobody ever licked a symptom.

In systems analysis, on the other hand, the first step is to define the problem. Problem definition is one of the major reasons that the "systems approach" is effective.

Let's take an example of a "systems approach". You, the boss, feel that one of your basic operations—production control—is not doing as well as it should. In this operation you use many people, spend lots of money, yet your results seem to be below par.

You want to do two things—to improve the quality *and* cut the cost.

The first thing your systems analyst does is to define the exact beginning and the exact end of your "production control systems-cycle".

Next he counts *all* costs. He counts all the people who take part in the operation. If some people work in the cycle only part of their time, he counts that part. Let's say that he counts 27½ people now in your production control operation. He adds up their salaries.

He does likewise on everything else in the operation cycle. If you customarily charge for floor space, he will include that. He'll include supplies, machines (depreciation), supervision, desks, chairs, files, equipment.

When he adds it all together, you'll then *know* your *present* cost for production control.

His next step is to find out how much useful work you get for your money. How many orders handled? How many engineering changes? How many rejections handled? Rework?

He'll also try to separate out the work that must be done because of lack of system—call it the useless work. How many errors made? How much expensive expediting? How much duplication? How many useless records, files, or logs?

These last will be dropped from the new system he designs, of course.

When the systems analyst completes these first two steps of his work, you'll know:

1. Your actual cost for the operation.
2. How much useful work you get.
3. How much useless work can be dropped.

When he has done this job, your systems analyst has laid a foundation for systems building. And we'll talk about that next. **s/p/a**

Book Review

The Practice of Management

by Peter Drucker (New York: Harper Brothers, 1954, Text Edition, $3.75)

Reviewed by Peter T. Swanish, Ph. D., Chairman, Department of Management, Loyola University, Chicago, Ill.

THE THEME of this useful book is the same as that of Professor Burnham's book, *The Managerial Revolution.* A free enterprise system—with the hot breath of social control ever on its neck, must make the best possible use of manpower, the productive power of machine tools, raw materials, in the process of want satisfaction if it is to live on. Burnham gave management a high place in "the wave of the future." Drucker also satisfies the managerial ego. Thus, "the entire free world has an immense stake in the competence, skill and responsibility of management." ". . . Management today has become an institution of our society."

Drucker regards management as an art—says that it can never be an exact science. Management is like any of the social sciences. Man is its main concern. And about man there is still much that is unknowable. Scientific methodology gives knowledge about nature and its laws. Real knowledge—about morals, value systems, the deeper meaning of things—is different.

'To be or not to be a science' is not the crucial question. Science does not solve all problems. It creates new ones. To remain in its high place, management would seem to need a value system more than it needs anything else. Policy always involves management in value judgements. The effect of its decisions transcends indifference curves. It does matter to society that 'the house burns down.'

What is important is that management is practiced in the 'scientized' temper. As Urwick observed, the temper of the old-time craftsman who learned his craft by trial and error, and practiced it in the half-light of custom and tradition, means failure tomorrow. To keep emotion and prejudice out of decisions, make certain that the 'facts' are facts; to change inferences as facts change; criticize, improve notions and beliefs instead of going down with them, to question what 'appears to be' but is not always so—is enough for an art-based-on-science. And it is a must, for "the days of intuitive management are numbered."

To stay with the methodology of science in decisions about policy, planning, organization, coordination, control, supervision, direction and motivation, is to make sound decisions. This is the methodology of Taylor's *Scientific Management.* Drucker deals with the process in Chapter XXVIII. Emphasis must always be on the 'right' questions. Nothing is as worthless as right answers to the wrong questions. "Every decision is a long-range decision, and decisions concerning the future are anticipations." (p. 88).

Chapter XXIX, (The Manager of Tomorrow) is a synthesis of Chapters IX, (Management by Objectives), XII, (Managers Must Manage), and XV, (Developing Managers). "The survival of any business depends on the performance of its managers." "It is the essence of an industrial society that it increasingly substitutes skill, theoretical knowledge, ability to organize and lead." This is the nut of these chapters.

The gist of Chapter XIX, (The IBM Story) is that the "ranks of highly trained technical, professional people will swell beyond all experience and expectations." In Chapter XXVII, (The Manager and His Work), we find that "the manager has the task of creating a true whole that is larger than the sum of the resources put into it . . ." (p. 341). The second explicit task of management "is to harmonize in every decision and action the requirements of the immediate and the long-range future." (p. 342).

As for the manager of tomorrow, we will need "advanced education for people already in management . . . liberal education for use . . . it will have strict methods and real standards of self-discipline and ethics." (p. 376).

Not all is wheat in the book. There is chaff. There is a mixture of infallibilism and the threadbare. Thus, "profit is not a cause . . . it is the result." (p. 46). ". . .The thing certain about the future is its uncertainty." "The first duty of the business is to survive . . ." "Managing a business must be entrepreneurial in character . . ." Stopping to pummel the obvious gets three chapters of the Introduction, and a good part of Part One (Managing a Business) off to a very slow start. Chapter XXI, (Is Personnel Management Bankrupt?) is a provocative one. It should arouse personnel people who are wont to flit around the periphery of human relations problems and still go on believing they are at the grass roots.

The 'slips' in the book are few. They do not reduce the size of its importance in the storehouse of usable works on management. Kettering once said that "you can communicate a message around the world in seven seconds, but for a simple idea to penetrate a quarter-inch of human skull may require years." From the book to the practice of management—this will be many years in the process of realization. **s/p/a**

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